Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Review of Part 87 of the Commission's Rules	)	
Concerning the Aviation Radio Service	)	WT Docket No. 01-289

COMMENTS OF ROCKWELL COLLINS, INC.

Rockwell Collins, Inc. ("Rockwell Collins") pursuant to Section 1.415 of the Federal Communications Commission's ("Commission's") or ("FCC's") rules, hereby files electronic comments in the above referenced proceeding,[1] which seeks to revise the Part 87 rules governing Aviation Radio Service.

INTRODUCTION

Rockwell Collins is a global company and major manufacturer and integrator of avionics and Global Positioning System (GPS) equipment for civilian and military markets. Rockwell Collins manufactures a complete line of civilian and military aeronautical radio communications, navigation, and surveillance equipment, including Instrument Landing System (ILS) receivers, L-Band Distance Measuring Equipment (DME), Traffic Alert and Collision Avoidance units, Air Traffic Control Radar Transponders, L-Band Aeronautical mobile satellite communications equipment, C-Band Radio Altimeters, Microwave Landing System (MLS) receivers and weather radars.

Rockwell Collins is an active participant in numerous RTCA committees recommending technical standards for avionics equipment. Rockwell Collins is also active in the policy

[1] *See* In the Matter of Part 87 of Commission's Rules Concerning Aviation Radio Service, WT Docket No. 01-289, Second Report and Order and Second Further Notice of Proposed Rule Making, 77 Fed. Reg. 70710 (December 6, 2006)("NPRM").

formation of the future national airspace system with the Federal Aviation Administration ("FAA").

DISCUSSION

Rockwell Collins commends the Commission for undertaking the complex task of bringing the FCC's regulation in-line with today's technological advances. We are pleased that the FCC continues to reexamine its rules for Part 87 and hope the Commission will continue to stay abreast of the technological advances affecting the national airspace system.

Our comments are limited to paragraphs A and C of the NPRM:

A. AMS(R)S Operations in the 1.6 GHz, 2.0 GHz, and 5 GHz and Other Frequency Bands

The Commission has invited comments as to whether it should further amend the rules for Part 87 in order to support its objective of streamlining and updating rules, maximizing operational flexibility, promoting efficient use of the spectrum, and enhancing aviation safety.[2] To help accomplish this worthwhile goal, Rockwell Collins recommends that the Commission modify the technical requirements of Part 87 to allow the certification of Aircraft Earth Station ("AES") equipment designed to use Inmarsat Swift64 and SwiftBroadband services without first having to obtain a waiver. This would help to achieve the FCC's objective of streamlining and updating rules to reflect changes in technology.

The current Part 87 regulations pertaining to Aeronautical Mobile Satellite (Route) Service ("AMS(R)S") were written specifically for equipment that use the classic Inmarsat ("Aero-H" and "Aero-L") services. Subsequently, Inmarsat launched the Aero-I service.[3] Inmarsat then introduced the Swift64 service, which offers higher data rates than accommodated under Part 87. As a result, the current rules do not account for Swift64 and SwiftBroadband

[2] NPRM, Paragraph 29.

[3] Equipment that operated using the Aero-I service did not require waivers because section 87.137 (footnote 16) permitted the operation of equipment that used lower values of necessary and authorized bandwidth.

services and AES equipment designed to use Swift64 service must obtain waivers of Part 87 of the FCC regulations before they can be certified by the Commission. Rockwell Collins has so far received FCC certification for three satellite communications transceivers that use the Swift64 service after first obtaining the necessary waivers of Part 87 of the Commission's rules.[4] Later this year, Inmarsat plans to introduce SwiftBroadband service.[5] Rockwell Collins recommends that the Commission update its regulations to enable manufacturers of AES equipment that use Swift64 and the soon-to-be-introduced SwiftBroadband service to obtain FCC certification without first obtaining waivers. Rockwell Collins, therefore, suggests the following changes in the following technical requirements:

87.131 Power and Emissions

Section 87.131 currently permits AESs to use G1D, G1E, and G1W emissions,[6] which are appropriate for the Bi-Phase Shift Key (BPSK) and Quadrature Phase Shift Key (QPSK) modulations. BPSK and QPSK modulations are used by the Aero-H and Aero-L Inmarsat services but the Swift64 and SwiftBroadband services utilize a 134,400 bps 16 Point Quadrature Amplitude Modulation ("16-QAM") which has authorized emissions of D1D, D1E, D1W, D7W, and G7W. We urge the Commission to amend the regulation to reflect the authorized emissions of Swift64 and SwiftBroadband. Rockwell Collins, therefore, recommends revising the table in section 87.131 as follows:

Class of station	Frequency band/ frequency	Authorized emission(s)	Maximum power
Aircraft Earth	UHF	G1D, G1E, G1W, D1E, D1D, D1W, D7W, G7W	60 watts[8]

[4] FCC ID: AJK8221772 (certification granted on April 21, 2003), AJK8222231 (certification granted on October 17, 2006), and AJK8222231 (certification granted on October 17, 2006).

[5] *See* Inmarsat Announcement about Swiftbroadband service, *available at* http://aero.inmarsat.com/services/swiftbb.aspx?top_level_id=2&sub_level_id=1&language=EN&textonly=False

[6] *See* 47 CFR 87.131.

87.133 Frequency Stability

The current frequency tolerance for an AES operating in the 470-2450 MHz is +/- 320 Hz, which is overly restrictive for Swift64 service.[7] Inmarsat only requires terminals that operate using the Swift64 service have a frequency tolerance of +/- 1250 Hz.[8] The relaxed spacing is permitted for Swift64 AES terminals because the channel spacing has been designed to accommodate this accuracy without causing adjacent channel interference. Rockwell Collins proposes that the Commission change the section 87.133 requirement to permit AES terminals that use the Swift64 or SwiftBroadband service to have a frequency tolerance equivalent to level required by the satellite service provider. In addition, Rockwell Collins recommends that the FCC should require the manufacturers to affirmatively state that the AES equipment meets the technical requirement of the satellite service provider.

87.137 Types of Emission

Section 87.137 permits AESs to only use G1D emissions.[9] Rockwell Collins believes that the regulation be modified to incorporate the class of emissions for Swift64 and SwiftBroadband services. We recommend that section 87.137 be changed to reflect the same emissions that will be listed in section 87.131 above. Rockwell Collins proposes revising the section of the table pertinent to AESs as follows:

Class of Emission	Emission Designator	Authorized Bandwidth (kilohertz)
G1D[16]	21K0G1D	25
G1E[16]	21K0G1E	25
G1W[16]	21K0G1W	25
D1D[16]	40K0D1D	45
D1E[16]	40K0DIE	45

[7] *See* 47 CFR 87.133.
[8] Inmarsat Mini-M System Definition Manual, Section B- Technical Requirements for Mini-M Mobile Earth Stations. Section 3.5.6.2.2.
[9] *See* 47 CFR 87.137.

D1W[16]	40K0D1W	45
G7W[16]	200KG7W	225
D7W[16]	200KD7W	225

87.139(i) Emission Limitations

The Commission's rules for emissions limitations are listed in section 87.139. Section 87.139(i) lists the requirements for AES when there is a conflict with other parts of 87.139.[10] The second sentence of section 87.139(i) currently states, "When using G1D, G1E, or G1W emissions in the 1646.4 -1660.5 MHz frequency band, the emissions must be attenuated as shown below." We recommend that the second sentence in section 87.139(i) be changed to reflect the additional emissions of AES equipment that use Swift64 or SwiftBroadband services. Rockwell Collins recommends that the sentence be rewritten as:

> "When using emissions in the 1646.4 -1660.5 MHz frequency band, the emissions must be attenuated as shown below."

Rockwell Collins also respectfully suggests that section 87.139(i)(1) be modified because the current limitations of spurious emissions are overly restrictive. The Commission, in its previous Notice of Proposed Rulemaking,[11] requested comment on whether it should amend section 87.139(i) to reflect the same standards[12] established by the FAA in the Technical Standards Order governing AMS(R)S. After receiving comments, the FCC decided to adopt the same standards as the FAA.[13] Rockwell Collins submitted comments to the proceeding.

---

[10] *See* 47 CFR 87.139(i).
[11] *See* Review of Part 87 of Commission's Rules Concerning the Aviation Radio Service, *Notice of Proposed Rulemaking*, WT Docket No. 01-289, 16 FCC Rcd 19005 (2001).
[12] The standards for AMSS are located in RTCA DO-210D "Minimum Operational Performance Standards for Geosynchronous Orbit Aeronautical Mobile Satellite Services (AMSS) Avionics" ("MOPS").
[13] *See* Review of Part 87 of Commission's Rules Concerning the Aviation Radio Service, *Report and Order and Further Notice of Proposed Rulemaking*, WT Docket No. 01-289, 18 FCC Rcd 21432 (2003) (*Report and Order* and *FNPRM*, respectively).

Although Rockwell Collins recommended that the standards from MOPS be adopted,[14] we did not realize that the FCC would apply the same standards to emissions from the equipment and the wiring. The current requirement of -203 dBc/4 kHz for AES equipment operating in the 1525-1559 MHz band is so restrictive that manufacturers must now apply for a waiver when seeking certification for the new equipment.[15] The spurious emission limits should be set at levels that prevent the transmitter from interfering with other services operating in other bands. The limits should also take into account the characteristics of the other systems that operate in the adjacent bands. Rockwell Collins proposes that the FCC have separate emission limits for antennas and equipment and wiring. Rockwell Collins recommends amending section 87.139(i)(1) as follows:

> (1) At rated output power, while transmitting a modulated single carrier, the composite spurious and noise output shall be attenuated below the mean power of the transmitter, pY, by at least:
>
> For emissions from antennas:

Frequency (MHz)	Attenuation (dB) [1]
0.01 – 1559	-135 dB/4 KHz
1525 – 1559	-203 dB/4 KHz
1559 – 1585	-155 dB/MHz
1585 – 1605	-143 dB/MHz
1605 – 1610	-117 dB/MHz
1610 – 1610.6	-95 dB/MHz
1610.6 – 1613.8	-80 dBW/MHz[3]
1613.8 – 1614	-95 dB/MHz
1614 – 1626.5	-70 dB/4 KHz
1626.5 – 1660	-70 dB/4 KHz[2,3,4]
1660 – 1670	-49.5dBW/20 KHz[2,3,4]
1670 – 1735	-60 dB/4 KHz
1735 – 12000	-105 dB/4 KHz
12000 – 18000	-70 dB/4 KHz

[14] *See* Rockwell Collins Comment for *Notice of Proposed Rulemaking*, WT Docket No. 01-289, at 3.
[15] *See* 47 CFR 87.139(i)(1).

For emissions from equipment and wiring:

Frequency (MHz)	Attenuation (dB) [1]
.005–1559	83 or (65+10 log10 pY), whichever is greater.
1559–18000	55 or (37+10 log10 pY) 2, whichever is greater.

It is also recommended that section 87.139(i)(3) be amended because the emission mask requirements, which were established to control adjacent channel interference, are based on classical Aero services. The emission masks for AES equipment differ depending on the specific modulation types (BPSK, QPSK, and 16-QAM) and the channel rates available. Currently, the satellite station providers require that manufacturers of AES equipment demonstrate that the equipment complies with the provider's emissions mask limits before the equipment is allowed to access the system. Rockwell Collins recommends that section 87.139(i)(3) be deleted. Instead, we propose that the FCC should require the manufacturers of AES equipment to affirmatively state that the equipment meets the satellite service provider's emissions mask requirements and also provide data showing compliance.

87.141 Modulation Requirements

Section 87.141(j) requires AESs to use BPSK for data rates up to and including 2400 bps and QPSK for higher rates.[19] The Swift64 service utilizes BPSK for transmission rates of 3000 bps and 16-QAM for the 134,000 bps channels. Rockwell Collins recommends that section 87.141(j) be deleted. In addition, it is recommended that the FCC should require the manufacturers to state the data rates and modulation types in the equipment authorization applications.

87.145 Acceptability of transmitters for licensing

[19] *See* 47 CFR 87.141(j).

Section 87.145(d) requires AESs to correct transmission frequencies of Doppler effect relative to the satellite and that the signal not deviate more than 335 Hz from the desired transmit frequency.[20] Inmarsat's accuracy requirement for the Swift64 service is +/- 1250 Hz.[21] Inmarsat requires all AES equipment be tested to demonstrate that they meet the technical requirements before they are permitted to access the system. Rockwell Collins recommends deleting the sentence that states "The transmitting signal may not deviate more than 335 Hz from the desired transmit frequency."[22] Rockwell Collins also proposes modifying the third sentence of section 87.145(d) to read:

> "The applicant must attest that the equipment provides adequate Doppler effect compensation and where applicable, that the measurements have been made that demonstrate compliance with the technical standards of the satellite service provider."

C. Channel Spacing in the Aeronautical Enroute Service

The Commission has requested comments on whether it should narrowband the aeronautical enroute service channels as proposed by ARINC.[23] ARINC has proposed that 8.33 kHz channelization be introduced into the U.S. airspace.[24] Rockwell Collins agrees with ARINC that 8.33 kHz channelization should be introduced into the U.S. airspace. However, there are other technologies available and under consideration that can provide the same or better capabilities.[25] Rockwell Collins suggests that the Commission wait on deciding whether to adopt the ARINC proposal until the Future Communications Study (FCS) group[26] recommendation is

---

[20] *See* 47 CFR 87.145(d).
[21] Inmarsat Mini-M System Definition Manual, Section B- Technical Requirements for Mini-M Mobile Earth Stations. Section 3.5.6.2.2.
[22] *See* 47 CFR 87.145(d).
[23] *See* NPRM, Paragraph 35.
[24] *See* ARINC Comments to the FNPRM at 6.
[25] The VDL Mode 3 NEXCOM communications system operates on 25 kHz channel spacing capability and also integrates voice and data services. It can provide a four times increase in channel capacity.

[26] FAA and EUROCONTROL jointly created the Future Communications Study (FCS) group in 2004 to identify a technology that can be globally adopted to provide aeronautical communications needs for the foreseeable future.

released later this year. Rockwell Collins recommends that the Commission adopt the technology that is recommended by FCS.

CONCLUSION

Rockwell Collins supports the Commission's desire to reflect technological advances affecting the aviation radio service. By revising the technical regulatory requirements, the Commission can fulfill its desire to accommodate advances in digital communications technology. Rockwell Collins looks forward to working with the Commission on these important issues. Please direct any question to John Gifft at 703-516-8213.

Respectfully Submitted,

ROCKWELL COLLINS, INC.

By: Linda C Sadler

Linda C. Sadler
Director
Governmental and Regulatory Affairs
1300 Wilson Blvd.
Suite 200
Arlington, VA 22209
703-516-8200
lcsadler@rockwellcollins.com

March 6, 2007